YURGENSON, A.A.

The authors report the following results: Preliminary heat treatment influences the brittleness of a nitrided layer to a considerable degree; in the nature of a preliminary heat treatment of the 38KhMYuA steel, quenching at 930°C in water was recommended as this guarantees higher mechanical properties than quenching in oil and less brittleness of the nitrided layer, and, in addition, the saving of considerable quantities of oil. The sharp decline of the brittleness of the nitrided layer of the sample quenched at temperatures over 1,000°C was explained by the growth of the grain of steel and by the formation of a nitride network. (Metallovedeniye i Obrabotka Mettalov, No 4, Apr 57, pp 41-44) (U)

SUM. 1324

*Formation of Aluminium Nitride in Nitriding [of Aluminium]. A. A. Yurgenson (Metallovedenie i Obrabotka Metallov, 1956, (3), 50-52). [In Russian]. Steels to be nitrided contain Al, but there is no evidence for the formation of Al nitride in steels. Yu. therefore studied the nitriding of Al itself. Specimens of A2 Al were heated in NH_3 for 12 hr. at 610° C. (degree of dissociation 15%), then for 35–45 hr. at 540° C. (degree of dissociation [illegible]%), and cooled in a current of NH_3 to 200° C.; this cycle was repeated several times. X-ray photographs taken after 10 cycles (~720 hr.) showed lines for pure Al, except for a few weak Laue diffraction spots from the coarse grains of the specimen. Chem. analysis indicated N contents of 0·010% after 2 cycles (~144 hr.), and 0·076% after 10 cycles. Al foil 0·1 mm. thick, nitrided for 360 hr. (5 cycles), failed in a bend test after 25 bends (68 for the original foil). To ensure that oxide layers did not interfere, some specimens were etched in [illegible] NaOH soln. and given anodic treatment in H_2SO_4 soln. before nitriding. No differences in microstructure or hardness were observed. There is no evidence for the formation of Al nitride on Al.

—[illegible] V. E. T.

AUTHOR: Yurgenson, A.A., Engineer, and Pogrebetskaya, T.M., Engineer.

129-4-8/17

TITLE: On reducing the brittleness of the nitrided layer of the steel 38XMЮA. (O ponizhenii khrupkosti azotirovannogo sloya stali 38KhMYuA)

PERIODICAL: "Metallovedenie i Obrabotka Metallov" (Metallurgy and Metal Treatment) 1957, No. 4, pp. 41 - 44 (U.S.S.R.)

ABSTRACT: The preliminary heat treatment influences to a considerable extent the brittle strength of nitrided steel. On the basis of experiments, which are described in some detail, the authors recommend hardening from 930 °C in water since they found that such treatment ensures better mechanical properties than hardening in oil, the brittleness of the nitrided layer is reduced and considerable savings are made in the quantity of required oil. A sharp decrease of the brittle strength of nitrided layers of specimens hardened from temperatures above 1 000 °C is attributed to growth of the steel grain and formation of a nitride lattice. The investigations related to cylinder liners, the material of which contained 0.39% C, 1.45% Cr, 0.60% Al and 0.14% Mo. 25 x 30 mm specimens

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On reducing the brittleness of the nitrided layer of the steel 38XMЮA. (Cont.) 129-4-8/17

cut out from annealed tubes were hardened from 850, 900, 1 000 and 1 050 °C in water and tempered at 640 °C. The holding time during hardening was 1.5 hours, during tempering 3 hours.

There are five figures including two graphs, and three Slavic references.

ASSOCIATION: Sverdlov Turbine Works. (Sverdlovskiy Turbomotornyy Zavod)

AVAILABLE:

Card 2/2

1. Sverdlovskiy Turbomotornyy Zavod.
(case hardening) (Steel - Brittleness)

YURGENSON, A.A.

129-10-8/12

AUTHOR: Vyshkovskiy, Yu.G. and Yurgenson, A.A., Engineers.

TITLE: Influence of cold treatment on certain mechanical properties of high alloy, case-hardened steels. (Vliyaniye obrabotki kholodom na nekotoryye mekhanicheskiye svoystva vysokolegirovannykh tsementovannykh staley)

PERIODICAL: "Metallovedeniye i Obrabotka Metallov" (Metallurgy and Metal Treatment), 1957, No.10, pp. 33-35 (U.S.S.R.)

ABSTRACT: Introduction into industry of cold treatment for eliminating the residual austenite in the cemented layer of the high alloy steels 18XHBA, 18XHMA and 12X2H4A involves considerable difficulties, as was mentioned in several published papers (2) to (5). Some authors pointed out that cold treatment affects adversely the mechanical properties of cemented specimens, i.e. not only the ductility but also the strength values and Sadovskiy, V.D. et alii (7) attributed this adverse effect to the formation of micro-cracks and Sokolov, K.N. (9) recommends using cold treatment only for components which are not very highly stressed. The authors of this paper consider it of interest to compare the influence of cold treatment on the mechanical properties of the specimens for various distributions of the residual austenite in the cemented layer. For this purpose, they subjected 30 ground specimens, 10x10x120 mm

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129-10-8/12

Influence of cold treatment on certain mechanical properties of high alloy, case-hardened steels. (Cont.)

of the steel 18XHBA to cementation at 890 C for 9 hours, using a solid carburisation agent, whereby a cementation depth of 0.80 mm was obtained. After the cementation process, one batch of the specimens was cooled in oil, whilst the other was cooled in air inside the case-hardening box. After cementation, all the specimens were cooled to -78 C and held at that temperature for 3 hours and, following that, they were tempered at 150 C for 2 hours. Some of the specimens were then tested directly for static bending whilst others were tested for static bending after grinding off 0.05 and 0.10 mm at 2 opposite edges ; in the latter case, the ground edges were perpendicular to the direction of the bending load. The results are entered in Tables 1 and 2. An increase in the cooling speed after case-hardening, which prevents the formation of troostite skin in that part of the case-hardened layer which contains free carbides, brings about an improvement in the mechanical properties of low temperature treated specimens as compared with those which were cooled slowly and where conditions for formation of a troostite edge are more favourable. Removal of a part of the case-hardened layer by grinding improves the mechanical

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129-10-8/12

Influence of cold treatment on certain mechanical properties of high alloy, case-hardened steels. (Cont.)

properties of all the specimens and the improvement is more pronounced in the slowly-cooled specimens; after grinding off 0.1 mm, the mechanical properties of both groups of specimens were almost equal.

There are 2 tables, 3 figures and 13 Slavic references.

AVAILABLE: Library of Congress

Card 3/3

YURGENSON, A.A.

BOGACHEV, I.N., doktor tekhnicheskikh nauk, professor; GITEL'ZON, Ya.M., inzhener; POGREBETSKAYA, T.M., inzhener; YURGENSON, A.A., inzhener.

Investigating the cavitation and erosion resistance of the 38KhMIUA zinc coated and nitrided steel. Vest.mash. 37 no.9:24-26 S '57. (MLRA 10:9)

(Steel--Testing)

GITEL'ZON, Ya.M., inzh.; POGREBETSKAYA, T.M., inzh.; YURGENSON, A.A., dots.

Nitrogenizing EI723 and 15Khl1MF steels for operation at elevated temperatures. Energomashinostroenie 4 no.7:32-35 Jl '58.
(Case hardening) (MIRA 11:10)

SOV/137-59-3-7003

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 3, p 296 (USSR)

AUTHORS: Vyshkovskiy, Yu. G., Yurgenson, A. A.

TITLE: A Novel Technological Process of Heat Treatment of Atomizer Housings (Novyy tekhnologicheskiy protsess termicheskoy obrabotki korpusov raspyliteley)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1958, Nr 68, pp 132-140

ABSTRACT: Heat treatment of all atomizer housings made of steel 18KhNVA is carried out in accordance with the following procedures: Pack carburizing at a temperature of 880-900°C until a carburized layer 0.5-0.8 mm deep had been obtained (exposure time 3.5-4 hrs); cooling in air in closed boxes to a temperature of 70° or lower. Components which had successfully passed metallographic inspection are removed and placed into a cooler unit (direct contact with dry ice) for a period of 2 hours; after drying at 100°, they are wiped dry and are then subjected to individual hardness testing (R_A=82). This is followed by tempering in an oil bath at a temperature of 220-240° for a period of 5 hours. After tempering, 5-10% of the components are again subjected to hardness testing (R_A=79-81), and the entire batch

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SOV/137-59-3-7003

A Novel Technological Process of Heat Treatment of Atomizer Housings

is then transferred to the machine shop for final machining. The new heat-treatment technology proved to be stable and reliable under shop conditions. The degree of deformation was reduced, better fits between the atomizer housing and the needle valve were attained, and the occurrence of rejects due to jammed needle valves was eliminated.

A. B.

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SOV/126-7-1-15/28

AUTHOR: Yurgenson, ~~A.A.~~

TITLE: Role of Hydrogen in Nitriding of Steel (Rol' vodoroda pri azotirovanii stali)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol.7, Nr.1, pp 110-115 (USSR)

ABSTRACT: The influence of hydrogen on the nitriding process and the properties of the nitrided layer may be exerted in the following direction: (1) As the quantity of hydrogen in the gaseous phase increases, the latter occupies a larger number of active centres on the nitrided surface, renders absorption of nitrogen more difficult and thereby slows down the nitriding process (Ref.1). (2) An increase in the concentration of hydrogen in the gaseous phase makes the reversible reaction of nitride formation go to the left:

$$nMe + mNH_3 \rightleftarrows Me_nN_m + 3mH$$

Hence, a surplus of atomic hydrogen in the gaseous medium leads to denitriding of the steel by lowering the surface concentration of nitrogen (Ref.2). By removing hydrogen from the gaseous phase, it is possible to accelerate the

SOV/126-7-1-15/28

Role of Hydrogen in Nitriding of Steel

nitriding process. By placing FeSi into the nitriding furnace, it is possible to obtain SiH_4, to attain a decrease in the amount of hydrogen in the gaseous phase and to increase the rate of nitriding (Ref.3). (3) At the nitriding temperatures, hydrogen is bound to cause decarburisation of the metal surface by forming hydrocarbons and destroying carbides (Ref.2).

$$Me_nC_m + pH \rightleftarrows nMe + C_mH_p$$

This reaction causes an increase in the brittleness and a decrease in the surface hardness of the nitrided layer. (4) Hydrogen, having a small atomic radius, diffuses easily into the metal, thereby causing decrease in plastic properties and increase in brittleness of the nitrided layer (Refs.2, 4). As the degree of dissociation of ammonia and the quantity of hydrogen in the gaseous phase increases, its action must increase. The impact resistance and hydrogen content after nitriding metals with different coatings, are shown in Table 1. From this it can be seen

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Role of Hydrogen in Nitriding of Steel

that whereas a tin and copper coating fully protects the metal from being saturated with nitrogen, hydrogen diffuses into the steel through any coating, but most readily if the steel is phosphated. An additional tempering at 100-200°C brings about an increase in impact resistance of nitrided specimens, which is due to the influence of hydrogen contained in the nitrided steel. In order to study the decarburising action of hydrogen in nitriding, experiments were carried out in which the change in carbon content in chips was studied during prolonged nitriding. Also, experiments were carried out in which the composition of the carbonitride phases and the distribution of carbon along the depth of the nitrided layer was studied. Chips of various types of steel and cast iron were placed into brass net bags, and nitrided under production conditions together with block cases in PNA-1 furnaces, by: (a) heating to 510 ± 5°C and holding at this temperature for 12 hours: the degree of dissociation of ammonia does not exceed 35%; (b) heating to 540 ± 5°C and holding at this temperature for 38-45 hours: the degree of dissociation of ammonia does

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Role of Hydrogen in Nitriding of Steel

not exceed 65%; (c) cooling in dissociated ammonia (from the adjoining chamber) to 200°C. Simultaneously, 10 bags containing chips of one type of steel were placed into the furnace. After the nitriding cycle was finished, all bags were removed. Some of them were sent for chemical analysis, the rest were nitrided again. In this manner the carbon content in the chips submitted to nitriding for 1 - 10 cycles was determined. The results of this series of experiments are shown in Table 2. From this it can be seen that as the duration of nitriding increases the quantity of carbon in the chips sharply decreases, which is due to the decarburising action of hydrogen. For a further confirmation of these results the following experiments were carried out:- a strip of the steel 65G, 0.15 mm thick, was nitrided for 1 - 8 cycles; half of the specimens were nitrided in the usual manner, and half in bags filled with carbon. Data of carbon content after such treatment are shown in Table 3, from which it follows that nitriding in carbon brings about considerably less decarburisation than by the usual method. For the separation of carbonitride phases a method was used which

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was suggested for the determination of the carbide phase in carbon steel (Ref.6). The change in carbon content of the carbide phase can be seen in Table 4. Specimens of steel U8, 18 mm diameter and 22 mm long, were nitrided in the above manner for 1, 2 and 3 cycles, after which their carbon contents were determined. The results are shown in Figs.1, 2 and 3. An investigation of the interaction between hydrogen in the gaseous phase and carbon of the steel has shown that in nitriding one of the possible gaseous compounds is prussic acid. From the above experiments the author has arrived at the following conclusions:

1. During nitriding the carbon in the surface of the steel reacts with a gaseous phase, forming gaseous compounds (cyanides and probably carbon compounds).
2. A decrease in carbon content in the surface layer lowers the surface hardness of the nitrided layer, and increases the brittleness.
3. One of the reasons for the displacement of the maximum hardness into the depth of the nitrided layer is the decrease in carbon content in the surface layer.

SOV/126-7-1-15/28

Role of Hydrogen in Nitriding of Steel

There are 3 figures, 4 tables and 7 Soviet references.

ASSOCIATION: Ural'skiy turbomotornyy zavod (Ural Turbine Works)

SUBMITTED: April 16, 1957

Card 6/6

87947
S/114/60/000/006/006/008
E193/E383

18.1150

AUTHORS: Kostenko, A.V., Pogrebetskaya, T.M., Engineers and Yurgenson, A.A., Docent

TITLE: Study of Nitrided Steels 15Х11МФ (15Kh11MF) and 15Х12ВМФ (15Kh12VMF) After Prolonged Holding at 570 °C

PERIODICAL: Energomashinostroyeniye, 1960, No. 6, pp. 33 - 36

TEXT: Owing to the necessity of using nitrided heat-resistant steels in turbines operating under conditions of high steam pressures and temperatures, need has arisen to determine the effect of time and temperature on the properties of the nitrided layers; hence the investigation described in the present paper. The composition (in wt.%) of the steels used in the experiments was as follows:
steel 15Kh11MF - 0.15% C, 0.50% Si, 0.32% Mn, 10.62% Cr, 0.25% Ni, 0.70% Mo, 0.35% V, 0.015% S and 0.02% P;
steel 15Kh12VMF - 0.13% C, 0.26% Si, 0.66% Mn, 12.0% Cr, 0.45% Ni, 0.80% W, 0.59% Mo, 0.20% V, 0.012% S and 0.02% P.

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E193/E383

Study of Nitrided Steels 15Kh11MF and 15Kh12VMF After Prolonged Holding at 570 °C

The experimental test pieces were heat-treated (air-hardening from 1 050 °C plus tempering at 740 °C in the case of steel 15Kh11MF and oil-quenching from 1 000 °C plus tempering at 700 °C in the case of steel 15Kh12VMF), machined to 10 x 10 x 30 mm in size, electrolytically degreased, pickled, phosphated and then subjected to the nitriding treatment, which consisted of 20 hours at 530 °C, followed by 20 hours at 580 °C, the degree of dissociation of ammonia being 35% at the lower and 65% at the higher temperature. The Rockwell hardness of the surface of the nitrided specimens was the same for both steels and amounted to 91 HRN; the nitrided layer of steel 15Kh11MF was slightly thicker (0.37 mm) than that of the steel 15Kh12VMF (0.32 mm). The nitrided test pieces were then held at 570 °C for 6 000 hours and during this period the microhardness across the nitrided layer and its thickness were measured at regular intervals, and the

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Study of Nitrided Steels 15Kh11MF and 15Kh12VMF After Prolonged Holding at 570 °C

microstructure of the nitrided layers was examined. Some of the typical results are reproduced in Fig. 1, where the hardness (kg/mm^2) is plotted against the distance (mm) from the surface of the nitrided layer on steels 15Kh11MF (graph a) and 15Kh12VMF (graph b); experimental points marked by dots, crosses and circles relate to measurements taken immediately after nitriding, after 3 500 hours at 570 °C, and after 5 000 hours at 570 °C, respectively. Another set of results is given in Table 3: X

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Study of Nitrided Steels 15Kh11MF and 15Kh12VMF After Prolonged Holding at 570 °C

Time (hrs) at 570 °C	Depth (mm) of the nitrided layer (determined by microhardness measurements) on steel	
	15Kh11MF	15Kh12VMF
0	0.37	0.37
250	0.50	0.45
1500	0.55	0.50
3500	0.55	0.50
5000	0.60	0.60

Metallographical examination of the test pieces showed that the nitrided layer consisted of two (main and intermediate) sub-layers, the intermediate sub-layer in steel 15Kh11MF being more sharply defined than that in the other steel. The

X

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E193/E383

Study of Nitrided Steels 15Kh11MF and 15Kh12VMF After Prolonged Holding at 570 °C

increase in the thickness of the nitrided layer after holding at 570 °C was caused mainly by an increase in the thickness of the intermediate sub-layer, this increase being smaller in steel 15Kh12VMF. After holding at 570 °C, a light-grey film was formed on the surface of specimens of both steels. X-ray diffraction analysis showed that the film constituted a scale consisting of Fe_2O_3, Fe_3O_4 and $FeO.Cr_2O_3$. Of the two steels studied, the rate of scale formation was faster on steel 15Kh11MF. After prolonged holding at 570 °C nitrides were precipitated at the grain boundaries and the upper, nitrogen-rich part of the nitrided layer; at a later stage, these nitride precipitates became surrounded by an oxide layer. This effect is illustrated in Fig. 4, showing microphotographs (X340) of the nitrided layer in steel 15Kh11MF after: a) 250; b) 3 000 and c) 4 000 hours at 570 °C. According to the

X

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E193/E383

X

Study of Nitrided Steels 15Kh11MF and 15Kh12VMF After Prolonged Holding at 570 °C

present authors, the preferential oxidation of the nitrided layers along the grain boundaries is associated with the precipitation of nitrides which form a nitride-metal cell, thus creating conditions favourable for oxidation. Analysis of the results obtained led the present authors to the following conclusions.

1) A nitrided layer, formed on the more heat-resistant steel 15Kh12VMF, is more stable at higher temperatures than that formed on steel 15Kh11MF. The former steel can be recommended as the material for nitrided components operating at 570 °C.

2) In order to increase the resistance of nitrided layers against oxidation during service at elevated temperatures, the nitriding process should be carried out in such a manner as to prevent the formation of a nitride network.

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Study of Nitrided Steels 15Kh11MF and 15Kh12VMF After Prolonged Holding at 570 °C

3) The result of work conducted at the Turbomotornyy zavod (Turbomotor Plant) has shown that the optimum properties of the nitrided layer (thickness of the layer 0.2 - 0.4 mm, hardness not less than 89 HRN) formed on high chromium-content steels are obtained if the nitriding process consists of 12 hours at 530 °C, followed by 18 hours at 580 °C, the degree of dissociation of ammonia being 35% at the lower and 65% at the higher temperature. There are 6 figures, 3 tables and 5 Soviet references.

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YURGENSON, A.A.

81824

S/129/60/000/07/010/013
E193/E235

18.1130
18.9520

AUTHORS: Kostenko, A. V., Lopukhina, Ye. V., Pogrebetskaya, T. M., and Yurgenson, A. A., Engineers

TITLE: Structure of Nitrided Steel 15Khl1MF After Prolonged Service at Elevated Temperatures

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1960, No. 7, pp. 48-52

TEXT: Following their earlier findings (Ref. 1 to 3) that hardness of nitrided stainless and austenitic steels decreased after prolonged service at high temperatures, the present authors carried out a systematic study of this effect on nitrided specimens of steel 15Khl1MF which is frequently used as the material of some parts of steam turbines, operating at approximately 570°C. The test pieces, normalised at 1050°C and tempered at 740°C, were electrolytically degreased, pickled, phosphated and then nitrided by a two-stage process (20 h at 530°C followed by 20 h at 500°C, the degree of dissociation of ammonia being 35 and 65% respectively) which produced a nitrided layer 0.37 mm thick, with hardness HRN equal 95. The structure of the nitrided layer and the effect of prolonged

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81824

S/129/60/000/07/010/013
E193/E235

Structure of Nitrided Steel 15Kh11MF After Prolonged Service at Elevated Temperatures

(up to 5000 h) treatment at 570°C in air, was studied by X-ray analysis, metallographic examination, and microhardness measurements. It was established that, starting from its surface, the following strata can be distinguished in the surface layer of a nitrided steel: (1) $Fe_2N + Fe_4N + CrN$; (2) $Fe_4N + \alpha + CrN$; (3) $\alpha + CrN$; (4) α + carbides. On heating in air, an oxide scale is formed whose thickness, after 5000 h at 570°C, reaches 0.09 mm, and the surface layer of the nitrided steel after such treatment contains the following strata: (a) Fe_2O_3 (microhardness - 768 kg/mm^2); (b) Fe_3O_4 (microhardness - 455 kg/mm^2); (c) $FeO.Cr_2O_3$ (microhardness - 455 kg/mm^2); (d) $\alpha + CrN + FeO.Cr_2O_3$; (e) $\alpha + Cr_2N$; (f) α + carbides. The most intensive oxidation takes place in the region which originally consisted of iron nitrides. This is attributed by the present authors to the fact that nitrides form solid solutions which are homogeneous within a wide composition limit and which are characterised by a high concentration of vacant lattice

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E193/E235

Structure of Nitrided Steel 15Kh11MF after Prolonged Service at Elevated Temperatures

sites, facilitating diffusion of oxygen. Since hardness of the nitrided layer would be only slightly decreased by removing its outermost part (to a depth of say 0.1 mm), consisting mainly of iron nitrides, such a treatment should increase the resistance of nitrided steel to scale formation on prolonged heating and so prevent the decrease in hardness, usually taking place under these conditions. There are 3 figures, 2 tables and 7 Soviet references.

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4

YURGENSON, A.A.

S/129/60/000/011/004/016
E073/E335

AUTHORS: Belenkova, M.N., Kostenko, A.V., Mikheyev, M.N., Stoinskaya, E.K., Pogrebetskaya, T.N. and Yurgenson, A.A., Engineers.

TITLE: Influence of Heat Treatment and Nitriding on the Mechanical Properties of Austenitic Steels

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1960, No.11, pp.16-20

TEXT: A nitrided layer of austenitic steel can be ferromagnetic, although the core of the component can remain paramagnetic. By changing the preliminary heat treatment it is possible to obtain an austenite with various degrees of alloying and various compositions of the secondary phases. Changes in the phase composition during preliminary heat treatment of austenitic steel may bring about changes in its magnetic properties due to formation of δ-ferrite resulting from quenching at elevated temperatures. For this reason, the authors considered it of interest to study the influence of preliminary heat treatment and nitriding on the mechanical properties of austenitic steel. Two steels of the following compositions were investigated: (in %)

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Steel	C	Si	Mn	Cr	Ni	W	Ti	S	P
ЭИ123 (EI123)	0.18	2.27	0.65	14.54	13.80	1.79	0.84	0.007	0.016
1Х18Н9Т (1Kh18N9T)	0.10	0.38	0.33	17.78	8.70	-	0.64	0.013	0.020

The magnetic properties were studied after preliminary heat treatment followed by nitriding. The steel 1Kh18N9T was additionally subjected to "wrong" nitriding: tinned specimens were charged into a furnace simultaneously with the nitrided specimens of the same steel. The magnetic properties of the steel EI123 were determined after normalization annealing or after normalization annealing and ageing. The normalization temperature was 1150 and 1070°C. The preliminary heat treatment of the steel 1Kh18N9T consisted in quenching from 1150°C in water and subsequent ageing. Both steels

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were aged for 8 hours at 800°C. The specimens were in the form of 12 mm diameter, 5 mm long cylinders. The magnetic susceptibility of the steels EI123 and 1Kh18N9T in the paramagnetic state was measured by means of magnetic scales at various field strengths so as to determine the $\chi(H)$. For investigating the magnetic properties of the nitrided steels, specimens in the form of tubes with an external diameter of 8 mm, a length of 60 mm and a wall thickness of 0.5 mm were used. The external surfaces of the specimens were ground whilst the internal surfaces were machined by means of a reamer. Prior to nitriding, the specimens were etched in a hydrochloric acid solution at 70°C for 5 min and then nitrided in a laboratory furnace at 600°C, with a holding time of 65 hours for the steel EI123 and 75 to 95 hours for the steel 1Kh18N9T. The 75 hour holding time corresponded to the maximum depth of the nitrided layer for specimens with a wall thickness of 0.5 mm. The magnetic properties of nitrided specimens were measured ballistically in an open magnetic circuit. On the basis of the obtained results, which are given, the following conclusions are arrived at:

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E073/E535

Influence of Heat Treatment and Nitriding on the Mechanical Properties of Austenitic Steels

1) Changing of the normalization and ageing temperature of the steel EI123 from 1070 to 1130°C and additional ageing for [illegible] hours at 800°C does not bring about a change in the susceptibility of this steel.
2) Nitriding changes to a considerable extent the magnetic permeability of the investigated steels; the nitrided layers of both the investigated steels were ferromagnetic and this is due to the formation of nitrides, impoverishment in alloying elements of the austenite and austenite decomposition.
3) As a result of nitriding, the magnetic permeability of the steel EI123 increases considerably (by a factor of 3) as compared to the steel 1Kh18N9T.
4) Increase in the depth of nitriding brings about an increase of the maximum magnetic permeability; with increasing relative depth of the nitrided layer of the steel EI123 from 23 to 48.5% the maximum permeability increases by more than double. With increasing relative depth of the nitrided layer of the steel 1Kh18N9T from 30 to 93.65%, its maximum permeability increases from 3.7 to 19.8 gauss/Oe.

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Influence of Heat Treatment and Nitriding on the Mechanical Properties of Austenitic Steels

5). The results of the described investigations lead to the conclusion that it is possible to monitor the depth of the nitrided layer for a number of austenitic steels by means of an electromagnetic method. There are 1 figure, 5 tables and 5 references: all Soviet.

Card 5/5

80885
S/126/60/009/06/010/025
E111/E352

18.7400

AUTHORS: Kostenko, A.V., Lopukhina, Ye.V., Pogrebetskaya, T.M. and Yurgenson, A.A.

TITLE: Peculiarities in the Behaviour of Nitrided Type 1Kh18N9T Steel During Prolonged Residence at a High Temperature 18

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 6, pp 868 - 877 (USSR)

ABSTRACT: The authors point out that the nitriding of austenitic steels has not been used in gas-turbine construction (Ref 2) because of process and finishing difficulties and the insufficient high-temperature stability of the nitrided layer (Refs 3,4). A previous study by the authors of a group of nitrided steels (Ref 5) showed the superiority of type 1Kh18N9T steel in these respects and the present investigation aimed at a more detailed study. Specimens of the steel (0.10% C, 17.80% Cr, 9.7% Ni, 0.64% Ti, 0.012% S, 0.020% P, 0.53% Mn, 0.58% Si) were hardened from 1 150 °C, aged for 8 hours at 800 °C, pickled in hydrochloric acid and nitrided at 600 °C for 75 hours. A 0.29 mm deep nitrided layer with a hardness $H_{R_N} = 92$

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was obtained. The kinetics of reaction-diffusion of

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Peculiarities in the Behaviour of Nitrided Type 1Kh18N9T Steel During Prolonged Residence at a High Temperature

nitrogen and changes in the nitrided layer during prolonged holding at 680 °C in furnaces of a type IP-2 machine (as described in Ref 6) were investigated. For studying phases at increasing depth below the surface of the nitrided and scale-layer X-ray structural analyses of successive layers were carried out at the Ural'skiy gosuniversitet (Ural State University) in consultation with V.N. Konev. Figure 1 shows the structure of the nitrided layer before and after holding for 3 000 hours at 680 °C, while the oxides on an etched polished section after 250 hours is shown in Figure 2. The linear relations between the square of the gain in weight (g/mm^2) (Curve 1) and the square of the depth (mm) of the nitrided layer on the one hand and the duration of nitriding (hours) on the other given in Figure 3 indicates a parabolic law for nitrogen diffusion. The X-ray patterns from succesive layers before and after holding at 680 °C for 4 500 hours are shown in Figures 4 and 5, respectively, the nature of

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Peculiarities in the Behaviour of Nitrided Type 1Kh18N9T Steel During Prolonged Residence at a High Temperature

the phases being listed in Tables 1 and 2, respectively. The surface hardness of the nitrided steel is plotted against duration of holding (hours) at 680 °C in Figure 6, the corresponding effect on the depth of the nitrided layer being shown in Figure 7 (Curves 1, 2 and 3 refer to the whole, base, and transition layers, respectively). Figure 8 shows hardness as a function of depth below surface before and after holding for 5 000 hours (Curves 1 and 2, respectively). The work showed that saturation of the steel with nitrogen leads to austenite decomposition; the nitrogen is fixed as a nitride with the CrN structure. Prolonged holding at 680 °C gave an outer scale layer of ferric oxide and an inner layer of $(Cr,Fe)_2O_3$; iron nitrides dissociate; inside the nitrided layer complete austenite decomposition occurs, with equalization of nitrogen concentration with depth and formation and coagulation of nitrides. The authors recommend that nitriding conditions should be selected to give the greatest quantity of stable nitrides (not iron nitrides) mechanically

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E111/E352

Peculiarities in the Behaviour of Nitrided Type 1Kh18N9T Steel During Prolonged Residence at a High Temperature

hindering nitrogen diffusion and to prevent formation of much alpha-phase. There are 8 figures, 2 tables and 14 references, 12 of which are Soviet, 1 English and 1 German.

ASSOCIATION: Sverdlovskiy turbomotornyy zavod (Sverdlovsk Gas-turbine Works)

SUBMITTED: January 7, 1960

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S/129/61/000/012/002/005
E193/E383

1.1800

AUTHOR: Yurgenson, A.A., Engineer

TITLE: Selections of nitriding schedules and depth of the nitrided layer

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, no. 12, 1961, 13 - 16

TEXT: Side effects of nitriding are discussed in relation to the mechanical properties and corrosion-resistance of nitrided steels. It is pointed out that one of the consequences of the formation of nitrides is the formation of interphase boundaries with a heavily-distorted crystal lattice and refingment of the mosaic structure. Thus, in steel nitrided at 520 °C blocks measuring 5×10^{-5} cm appear, as a result of which the surface area of the sub-boundaries with distorted crystal lattice increases and internal stresses of the second type and distortions of the third type appear in the metal. Internal stresses of the first type are set up as a result of different thermal-expansion coefficients of the matrix and nitrides. At the same

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S/129/61/000/012/002/005
E193/E383

Selections of nitriding ....

time, the solid solution is denuded of the alloying elements; as a result, the stability of the solid solution in austenitic steels is decreased and the corrosion-resistance of stainless, acid- and oxidation-resistant steels is reduced. X-ray-diffraction studies of the distribution of stresses of the first type has shown that the maximum compressive stresses are situated at a certain distance from the surface. The magnitude of the compressive stresses decreases with increasing content of the ε-phase in the nitrided layer; when the ε-phase content exceeds 50% tensile stresses of up to 20 kg/mm^2 are set up in the surface layer (Ref. 2 - Fuks, M.Ya. and Tkach, A.Ya., Trudy KhPI im. V.I. Lenina. Seriya inzhenerno-fizicheskaya, v. 14, 1958). To attain maximum endurance limit, the formation of a surface nitride film or a nitride network must be avoided and the depth of the nitrided layer, Δ, must meet the condition $\Delta/r = 0.1 - 0.2$, where r is the distance between the neutral axis of the material and the most heavily-stressed fibre. In the case of localized nitriding, tensile stresses which decrease the

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resistance of the metal to cyclic loading are set up in the surface layer at a certain distance from the boundary between nitrided and untreated parts; this boundary, therefore, should not be placed in a region which carries service loads. Nitrides of Fe, Mo and probably Mn readily oxidize in air; if nitriding conditions are such that the steel is supersaturated with nitrogen, oxides instead of nitrides may be formed with a corresponding change in the properties of the nitrided layer. An oxide scale is readily formed on nitrided steel at 550 - 680 °C in the presence of a nitride network (Ref. 8 - A.V. Kostenko, Ye.V. Lopukhina, T.M. Pogrebetskaya and A.A. Yurgenson - FMM, v. 11, no. 6, 1960). A 17-fold increase in the resistance of steel 38ХМЮА (38KhMYuA) to cavitation-erosion is attained by nitriding. It has been shown, however (Ref. 10 - V.V. Gavratsek, D.N. Bol'shutkin - Trudy KhPI im. V.I. Lenina. v. IX, no. 1, 1957), that the erosion stability of the ε- and γ'-phases is 14 times lower than that of the α-phase. Consequently, if the maximum resistance-to-cavitation-erosion is to be imparted to a pearlitic steel, the formation

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Selections of nitriding ....

of a surface layer with a minimum content of the ε- and γ'-phases should be aimed at in nitriding. Maximum hardness of the nitrided layer is attained at a certain distance from the surface, this distance increasing with increasing depth of nitriding. When the object of nitriding is to improve the corrosion-resistance of steel, a continuous surface film of the ε-phase should be formed. The quantity of the ε-phase can be increased by raising the nitriding temperature to 700 °C. All the alloying additions except Al decrease the depth at which nitrogen-rich phases are formed. The quantity of the ε-phase formed depends also on the relative rates of adsorption and diffusion of nitrogen. If adsorption rate is higher than rate of diffusion, the surface becomes saturated with nitrogen and a nitride skin or network is formed. The rate of nitriding can be increased by raising the temperature which, however, brings about a decrease in the surface hardness. For this reason, a two-stage process provides the most convenient means of forming a nitride layer more than 0.25 - 0.30 mm thick in a relatively short time. Nitriding is carried out in the first stage

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E193/E383

Selections of nitriding ....

at 500 ± 10 °C for 10 - 15 hours to produce a hard case. The temperature is then raised to 540 - 580 °C for a short time, whereby the rate of diffusion of nitrogen is increased without significantly affecting the hardness of the surface layer. The properties of the nitrided case can be affected by the composition of the nitriding medium. Hydrogen formed as a result of dissociation of ammonia retards the diffusion of nitrogen, decarburizes the steel and decreases its plasticity. According to A.V. Smirnov and L.V. Beloruchev (Ref.13- Controlled atmospheres and their use in thermal and chemicothermal treatment of metals, LDNTP, 1960), improved results are obtained if a mixture of ammonia with an inert gas (molecular nitrogen or hydrogen) is used instead of pure ammonia. Tömöry. T (Ref. 14 - "Kohászati lapok", v. 2, no. 5, 1956) has shown that the rate of nitriding can be increased by using pure (99%) nitrogen instead of ammonia. Similarly, a harder case on a manganese-cast iron was obtained in a 65% nitrogen - 35% ammonia mixture than that formed in pure ammonia (Ref. 15 - Yu.G. Bobro, V.S. Kovalenko - Trudy KhPI im. V.I. Lenina, v. 9, no. 1, 1957). In general, a minimum thickness of the

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nitrided case should be aimed at, whereby the productivity of the nitriding equipment is increased and the risk of warping and distortion of the nitrided particles is minimized. Some consideration should be given to the geometry of a nitrided layer. The risk of distortion is less when the entire surface is nitrided but, in this case, the dimensional changes of the article are greater. When only a part of the surface is nitrided, the nitrided case should be symmetrical since, otherwise, distortion of the article will take place. In the case of stainless, acid- and oxidation-resistant steels, those parts of an article should only be nitrided which carry alternating service loads. With the exception of applications in which nitriding is used to increase the corrosion-resistance of steel, the optimum nitriding conditions are those which ensure conversion of all the alloying elements to nitrides and the formation of a minimum quantity of iron nitrides.
[Abstracter's note: this is an abridged translation.]

Selections of nitriding S/129/61/000/012/002/005
E193/E383

There are 1 figure and 15 references: 13 Soviet-bloc and 2 non-Soviet-bloc.

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PHASE I BOOK EXPLOITATION BR

Yurgenson, Aleksey Alekseyevich SOV/6108

Azotirovaniye v energomashinostroyenii (Nitriding In Power-Plant Machine Building). Sverdlovsk, Mashgiz, 1962. 128 p. 2800 copies printed.

Reviewer: Yu. M. Lakhtin, Professor, Doctor of Technical Sciences; Tech. Ed.: N. A. Dugina; Executive Ed. Of Ural-Siberian Department (Mashgiz): A. V. Kaletina, Engineer.

PURPOSE: This book is intended for process engineers and mechanical engineer-designers. It may also be useful to workers of scientific research institutes and laboratories.

COVERAGE: The book describes the nitriding methods and conditions which will improve the quality of the nitrided case, and is based on results of practices and investigations of plants which have been using the nitriding of important machine parts over long periods of time. Possibilities of applying the nitriding process to heat- and oxidation-resistant steels and other

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special types of steel are discussed, along with methods for the acceleration of the nitriding process. Nitriding of parts widely used in power-plant machine building is discussed at length in the last chapter. The book is mostly based on work and investigations carried out at the Ural Turbomotor Plant, under the supervision of the author, by Engineers T. M. Pogrebetskaya, A. V. Kostenko, Ye. V. Lopukhina, K. F. Korobka, L. I. Morova, G. V. Chentsova, and N. P. Kuznetsova, and by students L. V. Kudryavsteva, M. I. Nekrasova, V. V. Korovina, I. Ya. Chernikhova, Wang Ke-tsan, V. N. Zelenskiy, Sh. B. Verkhoglazov, and V. V. Rysenberg. There are 252 references, mostly Soviet.

TABLE OF CONTENTS:

ZELENSKAYA, G.I., inzh.; NOROVA, L.I.; YURGENSON, A.A.

Materials and the heat treatment of crankshafts for high-speed diesels. Metalloved.i term.obr.met. no.4:56-58 Ap '62. (MIRA 15:4)

(Cranks and crankshafts) (Steel--Heat treatment)

S/117/62/000/008/005/005
I007/I207

AUTHORS: Mikhalitsina, Ye.S., Revzina, V.G., and Yurgenson, A.A.

TITLE: Phosphate coating of austenitic steel

PERIODICAL: Mashinostroitel', no.8, 1962, 35

TEXT: Results are reported of experimental investigations on the phosphate coating of austenitic steels, in order to improve working conditions, reduce gripping (seizing) and wear, and increase the service life of phosphate-coated tools. Special indications on the phosphate-coating technology, and test results are presented. It was found that austenitic steels may be successfully phosphate-coated by applying special preparatory methods (electrolytic degreasing, pickling) and by utilising special electrolytes in electrical solutions. There is 1 table.

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S/126/62/013/004/019/022
E073/E135

18.7500

AUTHORS: Belenkova, M.M., Mikheyev, M.N., Pogrebetskaya, T.M., and Yurgenson, A.A.

TITLE: Magnetic properties of the steel 1Х18Н9 (1Kh18N9) after heat-treatment and nitriding

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.4, 1962, 622-625

TEXT: The authors and their team found earlier that the greater the content of elements forming stable nitrides, the more will the austenite become impoverished of alloying elements during nitriding and the more intensive will be its decomposition and the rejection of the α-phase. The influence of nitriding on the magnetic properties of steel similar to the previously tested 1Х18Н9Т (1Kh18N9T) steel but not containing titanium was studied to verify this conclusion. The compositions of the two steels studied were:
1Kh18N9: 0.14% C; 0,66% Si; 0.85% Mn; 17.68% Cr; 9.02% Ni, 0.07% Ti; 0.016% S; 0.016% P.

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1Kh18N9T: 0.1% C; 0.58% Si; 0.53% Mn; 17.78% Cr; 8.70% Ni; 0.64% Ti; 0.013% S; 0.02% P.

The magnetic properties were determined after heat-treatment (quenching from 1150 °C in water, followed by ageing for 8 hours at 800 °C). Both steels were paramagnetic in the quenched state and their susceptibility values were nearly the same. After ageing the susceptibility increased somewhat, the permeability of both steels after quenching and ageing approached unity and did not depend on the field strength. In the nitrided state the maximum permeability of the steel without Ti was considerably lower than in the steel with Ti. For a relative depth of the nitrided layer of 57.4% the steel 1Kh18N9 had a maximum permeability of 1.8 gauss/Oe, whilst for the steel 1Kh18N9T the maximum permeability was 3.7 gauss/Oe for a relative depth of the nitrided layer of 50%. The structures of the nitrided layers of both steels were identical, consisting of austenite and carbide grains in the heat-treated state; the structure of the nitrided layer was reminiscent of sorbite, due to the partial decomposition of the α-phase and the carbides during

Magnetic properties of the steel.. S/126/62/013/004/019/022
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nitride-formation. The following conclusions are arrived at: Nitriding changes considerably the magnetic properties of steels 1Kh18N9 and 1Kh18N9T; the ferromagnetic nature of the nitrided layer is due to the formation of the α-phase during nitriding. The steel 1Kh18N9T has a higher permeability in the nitrided state than the steel 1Kh18N9, and the difference is attributed to the presence of Ti in the former, which forms stable nitrides and impoverishes considerably the γ-phase of Ti, reducing its stability and bringing about rejection of α-phase. The stability of the austenitic structure after nitriding was determined by the concentration of admixtures required for forming uniform austenite and by the ability of the components entering into the austenite to form stable nitrides. The nitrided skin of austenitic steel components should have low permeability values. There are 4 tables.

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Magnetic properties of the steel.. S/126/62/013/004/019/022
E073/E135

ASSOCIATION: Institut fiziki metallov AN SSSR
(Institute of Physics of Metals, AS USSR)
Ural'skiy turbomotornyy zavod
(Ural Turboengines Works)

SUBMITTED: August 26, 1961

Card 4/4

S/810/62/000/000/010/013

AUTHORS: Pogrebetskaya, T. M., Yurgenson, A. A., Kostenko, A. V.

TITLE: High-temperature behavior of nitrided steels.

SOURCE: Metallovedeniye i termicheskaya obrabotka; materialy konferentsii po metallovedeniyu i termicheskoy obrabotke, sost. v g. Odesse v 1960 g. Moscow, Metallurgizdat, 1962, 245-257.

TEXT: The paper describes an experimental investigation showing that long-term exposure to high temperatures (T) of nitrided steels leads to the following phenomena: (1) Coagulation of the nitrides and dissociation of the less stable Fe nitrides, with attendant reduction in hardness; (2) diffusion in depth of the N freed as a result of the nitride dissociation and, therefore, a thickening of the nitrided layer affected; (3) interaction with O, which evokes the formation of a surficial oxide layer. The nitride-dissociation T determines the T limits for the use of nitrided steels. Steels containing greater amounts of elements that form stable and finely-dispersed nitrides conserve their hardness and the thickness of the nitrided layer more effectively. Nitrided steels intended for long-term operation at elevated T must retain a sufficiently great surface hardness, be free of nitride networks and, for austenitic steels, have a minimal quantity of α-phase.

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High-temperature behavior of nitrided steels. S/810/62/000/000/010/013

Specimens of the steels 15X11MΦ (15Kh11MF) and 15X12BMΦ (15Kh12VMF), which are ordinarily employed for nitrided parts of steam turbines operating at T of 535-570°C, and also steels 1X13 (1Kh13), ЭИ728 (EI728), and 1X18H9T (1Kh18N9T) were tested. The heat-treatment procedures employed are tabulated. Test T were 535, 550, and 570° for the first two steels and 680° for steel 1Kh18N9T. Maximal holding time: 6,000 hrs. Additional tests were made on the nitrided layer on valve stems made of steel 15Kh11MF, which had been in actual operation for 8,500 hrs. The change in hardness with time is graphed, also the depthwise distribution of the microhardness and the thickness of the nitrided layers as a function of the duration of the holding at the various high T's. The structure and the formation of the surface oxide layer are depicted in photos; they are substantiated by X-ray-diffraction analysis (full-page table). The oxidation process may be regarded as follows: The Cr oxidizes faster than the Fe in the surface layer, forming an oxide $(Cr, Fe)_2O_3$. Further oxidation is determined by the diffusion of the Fe and possibly the O through the layer of alloyed scale, whereupon a surface-scale layer consisting of Fe_2O_3 forms. The Fe nitrides in the nitrided layer dissociate, the N separated interacts with the Cr, forming Cr nitrides. Simultaneously, a gradual decomposition of the austenite in the nitrided layer proceeds. After 309 hrs there may still remain some γ-phase, but after 4,500 hrs the γ-phase lines on the X-ray graph disappears, and the structure

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consists of (α + CrN) phase, the lines of which become increasingly distinct. There are 10 figures and 2 tables; no references.

ASSOCIATION: Sverdlovskiy turbomotornyy zavod (Sverdlovsk turbo-engine plant).

YURGENSON, A.A.; ZELENSKAYA, G.I.; ASSONOV, A.D., doktor tekhn. nauk, retsenzent

[Metals for high-speed diesel engines and their heat treatment; a manual] Metally bystrokhodnykh dizelei i ikh termicheskaia obrabotka; spravochnoe posobie. Moskva, Izd-vo "Mashinostroenie," 1964. 266 p. (MIRA 17:7)

L 15265-65 EWT(m)/EWA(d)/EWP(t)/EWP(b) ASD(m)-3 MJW/JD/WB
ACCESSION NR: AP5001434 S/0114/64/000/008/0032/0036

AUTHOR: Zagvazdina, Ye. V. (Engineer); Pogrebetskaya, T. M. (Engineer); [illegible] (Candidate of technical sciences, Docent)

TITLE: Anticorrosive gas nitriding of cast turbine parts

SOURCE: [illegible] Energomashinostroyeniye, no. [illegible], 1964, 32-36

TOPIC TAGS: [illegible] steel, [illegible] iron, nitridation, corrosion resistance, corrosion resistant steel/25L steel, SCh21-40 cast iron, SCh28-48 cast iron

Abstract: Data are given on the increase in weight, phase composition, structure [illegible] corrosion resistance of specimens of 25L steel and cast irons SCh21-40 [illegible] corrosive gas nitriding and [illegible].
[illegible] increases the corrosion resistance of [illegible] steel and that [illegible]
[illegible] process [illegible] efficient, since it provides [illegible] anticorrosive nitriding than [illegible]

L 15265-65

ACCESSION NR: AP5001434

... combination of corrosion resistant and ductile properties was displayed ... obtained in the nitriding of 25L steel by the following mode: 530°C ... 10 hr ... the anticorrosion ... the parts should have a surface finish no less than ▽7.

The nitriding of cast irons is promising, since it is associated with an appreciable increase in hardness. Saturation of cast iron Sch21-40 with nitrogen ... than that of ... steel.

... of cavities on the surface of cast steel and iron parts is not ..., since it lowers the quality of the nitrided layer. Orig. art. has ... and ... table.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: MM, PR

NO REF SOV: 005

OTHER: 000

JPRS

Card 2/2

ZAGVAZDINA, Ye.V.; YURGENSON, A.A.

Investigating the slow nitriding of carbon steel. Fiz. met. i metalloved. 18 no.3:359-362 S '64. (MIRA 17:11)

1. Ural'skiy turbomotornyy zavod.

L 9811-65 EWT(m)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b) Ps-4 IJP(c) MJW/JD

AM5011304 BOOK EXPLOITATION UR/
546.3:621.436-185.4+621.78(083)
37

Yurgenson, A. A., Zelenskaya, G. I. 4 77

Metals of high-speed diesel engines and their heat treatment; a B+1 handbook (Metally bystrokhodnykh dizeley i ikh termicheskaya obrabotka; spravochnoye posobiye) Moscow, Izd-vo "Mashinostroyeniye", 1964. 266 p. illus., biblio., tables. 4500 copies printed

TOPIC TAGS: diesel engine, high speed diesel engine, diesel engine part, diesel engine material

PURPOSE AND COVERAGE: This book is intended for designers, mechanical engineers, and heat-treatment specialists working in diesel engine [illegible] plants. The book may also be useful for workers at research institutes and students at universities. The book reviews problems connected with the selection of materials for diesel engines, gives information on qualities of steel, cast iron, and alloys used for manufacturing high-speed diesel engines, discusses specific features of heat treatment, and suggests methods for increasing the life of individual parts. Substitute materials are discussed and general recomendations for material selection are provided.

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L 61810-65
AM5011304

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AM5013.74

3

SUB CODE: MM SUBMITTED: 18Apr64 NO REF SOV: 250

OTHER: 021

Card 3/3

ONOKHIN, V.F., inzh.; YURGENSON, A.A., kand.tekhn.nauk

Increasing the iron content of bronze for bimetal inserts. Lit. proizv. no.7:42-44 Jl '65. (MIRA 18:8)

L 29833-66 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6012239 SOURCE CODE: UR/0129/66/000/004/0075/0078

39

B

AUTHORS: Yurgenson, A. A.; Zagvazdina, Ye. V.

ORG: Turbine Engine Works (Turbomotornyy zavod)

TITLE: Multiple nitriding of 1Kh13 steel

18 18

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 4, 1966, 75-78

TOPIC TAGS: chromium steel, nitridation, x ray photography, x ray equipment, ammonia, phase composition/ 1Kh13 chromium steel, RKD x ray equipment

ABSTRACT: Specimens of 1Kh13 steel were nitrided in industrial furnaces under the following conditions: heating at 540C for 12 hrs; ammonia dissociation to 35%; heating at 540C for 48 hrs; ammonia dissociation to 65%; cooling under ammonia stream to 200C; air cooling. This process was repeated. X-ray photographs were taken with a RKD camera. In multiple nitriding of high-chrome steel, the surface layers were decarbonized; iron nitrides reacted with atmospheric oxygen and formed iron oxides. Chrome steel which has been nitrided nine times contains iron oxides and nitrides on the surface; phases containing chromium are absent. Excessive and repeated nitriding impairs the quality of the nitrided layer of high-chrome steels. Orig. art. has: 2 figures and 2 tables. 18

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 003

Card 1/1 UDC: 621.785.53:669.14.018.25

L 28848-65 EWT(m)/EWA(d)/T/EWP(t)/EWP(b) ASD(m)-3 JD

ACCESSION NR: AP4046088 S/0126/64/018/003/0359/0362

AUTHOR: Zagvazdina, Ye. V.; Yurgenson, A. A.

TITLE: Investigation of protracted nitriding on carbon steel

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 3, 1964, 359-362

TOPIC TAGS: nitriding, oxidation, carbonitride, phase distribution

ABSTRACT: The "U12" steel was subjected to nitriding with a view to determining its phase composition and character. The 15 x 15 x 40 mm specimens contained 1.19% C; 0.21% Si; 0.20% Mn; 0.010% P; 0.016% S; 0.11% Cr and 0.10% Ni. Two stage nitriding was carried out in the following cycles: (1) 510 C for 12 hrs., ammonia dissociation 35%; (2) 540C for 48 hrs, ammonia dissociation 65%. At the initial stage carbonitrides were identified in an atmosphere of 10% CO and 90% NH_3. After a tenfold nitriding the 0.98 mm thick case consisted of Fe_2O_3 oxide and Fe_2N nitrides whereby the iron oxide had an Fe_3O_4 structure at a depth of 1.2 mm. Chemical analysis showed that by extending the nitriding

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L 24848-65

ACCESSION NR: AP4046088

period the contents of carbon, nitrogen and bivalent iron decreases on the surface layer whereas trivalent iron increases. A specimen nitrided for five times had a surface layer of an Fe_2N structure up to a depth of 0.23 mm. At 0.35 mm a multiphase system composed of $Fe_\alpha + Fe_2N + Fe_4N + Fe_3C$ was identified and only ferrite and cementite lines at 0.39 mm. Oxidation of the case was caused by tenfold nitriding. Orig. art. has: 2 tables and 1 figure.

ASSOCIATION: Ural'skiy tubomotorny zavod (Urals Turboengine Plant)

SUBMITTED: 28Sep63 ENCL: 00

SUB CODE: MM NO REF SOV: 006 OTHER: 001

Card 2/2

YURGENSON, A. G.

YURGENSON, A. G. "A calculation of the combined operation of girder systems in reinforced-concrete structures." Min Higher Education Ukrainian SSR. L'vov Polytechnic Inst. L'vov, 1956. (Dissertation for the Degree of Candidate in Technical Science)

So: Knizhnaya letopis', No. 15, 1956. Moscow.

84286

10.3000

S/050/60/000/010/001/003
B012/B063

AUTHOR: Yurgenson, A. P.

TITLE: Investigation of the Structure of Turbulent Motions Causing Bumps to Modern Airplanes

PERIODICAL: Meteorologiya i gidrologiya, 1960, No. 10, pp. 3 - 8

TEXT: When investigating the structure of atmospheric turbulence causing bumps to airplanes, it is most convenient to employ the methods based on the theory of continuous random processes. These methods were first applied by M. I. Yudin in 1946 (Ref. 2). As the parameters determining the structure of turbulent motions, Yudin used the structure or difference functions of pulsating wind velocities. Formula (2) is written down as the structure function of the pulsation velocity of the wind ψ_k. In the present paper, a method is given for studying the structure of atmospheric turbulences by determining and analyzing correlations between the structure functions of the (2)-type and the statistical characteristics of bumps to planes. Following Yudin the author derives a set of differential equations which

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Investigation of the Structure of Turbulent Motions Causing Bumps to Modern Airplanes

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express the relationship between the dimensionless random values of pulsation of the various kinematic parameters of the plane $\xi_i(\tau)$ and the dimensionless functions $\psi_k(\tau)$ in the form of equation (4). τ = time. The author makes use of the general solution obtained in Ref. 2, and obtains formula (6). The latter is integrated, and the structural characteristics of the turbulent flow are thoroughly studied on the basis of criteria depending on the meteorological conditions. Using formula (7) according to the 2/3-law by Kholmogorov-Obukhov, the author obtains formulas (8), (9), and (10). The practical application of these formulas is illustrated by the calculation of characteristics of the pulsation values of the components of flying speed (ξ_1 and ξ_2) as dependent on the meteorological parameters (A_k, Δ, τ_o) determining the respective turbulent medium. A_k is a coefficient, and $\Delta = \tau_2 - \tau_1$. The curves shown in Fig. 2 were obtained in the course of computations made on the electronic computer "Ural". These curves illustrate the dependence of fluctuations of the horizontal (Fig. 2a) and vertical (Fig. 2b) components of flying speed on the intensity of action of horizontal and vertical turbulent flows. On the basis of the rules resulting from

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Investigation of the Structure of Turbulent Motions Causing Bumps to Modern Airplanes

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these curves, the author reaches the following conclusions: 1) The highest probability that a modern superfast airplane with a speed of $0.5<M<1.2$ enters the zone of bumpiness under otherwise equal conditions occurs in flights at medium and very high velocities. In this case, the intensity of bumpiness may largely depend on horizontal turbulent flows. Therefore, it is necessary that the meteorological service takes into account not only the vertical gradients of the wind-velocity vector but also the characteristics determining the intensity of horizontal turbulent flows. When the plane increases its speed, it is able to leave the zone of bumpiness without deviating from its course and flying height. It is noted that this is not always in accord with the briefing imparted to flight crews. It is further noted that the use of data concerning the overload of planes in the zone of bumpiness have only a relative value, since these data consider only the overload caused by vertical components. Professor M. I. Yudin is thanked for advice, and O. F. Lobov and L. Ya. Bulakhtina for solving the problem on the computer "Ural". There are 2 figures and 5 Soviet references.

Card 3/3

MUSAYELYAN, Shabo Aslanovich; YURGENSON, A.P., otv. ed.; ZHDANOVA, L.P., red.; BRAYNINA, M.I., tekhn. red.

[Mountain waves in the atmosphere]Volny prepiatstvii v atmosfere. Leningrad, Gidrometeoizdat, 1962. 142 p. (MIRA 15:9)

(Atmospheric turbulence)

MUSAYELYAN, Shabo Aslanovich; YURGENSON, A.P., otv. red.; ZHDANOVA, L.P., red.; BRAYNINA, M.I., tekhn. red.

[Lee waves in the atmosphere]Volny prepiatstvii v atmosfere. Leningrad, Gidrometeoizdat, 1962. 142 p. (MIRA 15:9)
(Mountain waves)

BORISENKOV, Ye.P.; YURGENSON, A.P., red.; OKSENOVA, Ye.I., red.;
STUL'CHIKOVA, N.P., tekhn.red.

[Physicostatistical methods for analyzing and precalculating meteorological fields] Fiziko-statisticheskie metody analiza i predvychisleniia meteorologicheskikh polei. Leningrad, Izd-vo "Morskoi transport," 1963. 243 p. (Leningrad. Arkticheskii nauchno-issledovatel'skii institut. Trudy, vol.263). (MIRA 17:4)

L 32100-65 EWT(1)/EWG(v) Pe-5/Pae-2 GW

ACCESSION NR: AR5005747 S/0169/64/000/012/B028/B028

SOURCE: Ref. zh. Geofiz., Abs. 12B160

30
B

AUTHORS: Yurgenson, A. P.

TITLE: Concerning investigations of the spectral transmission of ascending long-wave radiation in the atmosphere

CITED SOURCE: Tr. Arkt. i antarkt. n.-i. in-ta, v. 271, 1964, 19-30

TOPIC TAGS: albedo, atmospheric infrared absorption, atmospheric optics, high altitude radiation, upper atmosphere radiation

TRANSLATION: It is noted that an analysis of the results of determining the temperature of the underlying surface from measurements of the outgoing radiation in the 8-12 μ transparency window of the atmosphere, obtained with the aid of meteorological satellites, offers evidence that in most cases there are many errors due to the transformation of the radiation of the underlying surface by the layer of the atmosphere. It is emphasized in this case that further experimental and

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L 32109-65

ACCESSION NR: AR5005747

theoretical investigations must be made on the laws governing the transport of the long-wave radiation in the atmosphere. To this end, a scheme for calculating the spectral intensity of thermal radiation in the free atmosphere, suitable for electronic computer calculations, is described in detail. A procedure for determining the temperature of the underlying surface in the presence of data on spectral measurements of the outgoing radiation is discussed. K. Kondrat'yev.

SUB CODE: ES ENCL: 00

Card 2/2

L 37721-65 EWT(1)/FS(v)-3/EEG(v) Po-4/Pe-5/Pq-4/Pae-2/Pi-4
FSF(h)/FSS-2/ TT/GW S/3116/64/271/000/0019/0030 41 40 B+1

ACCESSION NR: AT5005817

AUTHOR: Yurgenson, A. P.

TITLE: Contribution to the study of the spectral origin of ascending longwave radiation in the atmosphere

SOURCE: Leningrad. Arkticheskiy i Antarkticheskiy nauchno-issledovatel'skiy institut. Trudy, v. 271, 1964. Chislennyye metody issledovaniya gidrometeorologicheskikh usloviy v Arktike i ispol'zovaniyem elektronnykh tsifrovykh vychislitel'nykh mashin; sbornik statey (Numerical methods of investigating hydrometeorological conditions in the Arctic using electronic digital computers; collection of articles), no. 1, 19-30

TOPIC TAGS: atmospheric radiation, longwave radiation, ascending radiation, meteorological satellite, numerical forecasting, satellite temperature data, radiation absorption

ABSTRACT: Evaluation of temperature data received from artificial satellites depends greatly on subsidiary absorption experiments in relation to various parts of the longwave spectrum. The most useful measurements are those for the absorp- ... of oxygen, carbon dioxide and ozone in the 1-20 micron range. The

of the longwave spectrum. The most useful ... 1.20 micron ...
of the longwave spectrum, carbon dioxide and ozone in the ...
tion bands of oxygen, ...

Card 1/2

L 37711-65
ACCESSION NR: AT5005817

present paper is concerned with the calculation, using the Ural-2 electronic computer, of the spectral intensity of longwave radiation from the air-earth interface and the upper edges of clouds according to measurements made by a radiation receiver appropriate to the flight level of an airplane. It is assumed that pressure, temperature and dew point distributions are simultaneously measured at this height. Starting from the equation of transfer and introducing a parameter for the effective content of absorbent material, a solution is obtained for the spectral intensity of upward directed radiation as a function of temperature and mean absorption and from this is formally derived the inverse function giving the characteristic radiation from the air-ground interface or ... step by step method, in

temperature and mean absorption and from this is formally derived the inverse function giving the characteristic radiation from the air-ground interface or the top of a cloud. This equation is solved using a step-by-step method, in terms of dew point and pressure of successive atmospheric layers. A preferred sequence for carrying out the calculations is then given. Orig. art. has: 3 tables and 43 formulas.

ASSOCIATION: Arkticheskiy i Antarkticheskiy nauchno-issledovatel'skiy institut, Leningrad (Arctic and Antarctic Scientific Research Institute)

SUBMITTED: 00 ENCL: 00 SUB CODE: ES, DP

Card 2/2 NO REF SOV: 003 OTHER: 002

ACC NR: AP6034770 SOURCE CODE: UR/0362/66/002/010/1040/1045

AUTHOR: Yurgenson, A. P.

ORG: Leningrad Hydrometeorological Institute (Leningradskiy gidrometeorologicheskiy institut)

TITLE: Influence of radiant influx of heat into the free atmosphere on the evolution of macrocirculational processes

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 2, no. 10, 1966, 1040-1045

TOPIC TAGS: heat radiation, atmospheric circulation, atmospheric thermodyanics, atmospheric stratification, synoptic meteorology, long range weather forecasting

ABSTRACT: The author reports the results of a simultaneous analysis of preliminary maps of radiant influx of heat to a layer of air contained between the isobaric surfaces 800 and 600 mb, and maps of the fields of the geopotential at the level p = 500 mb, obtained for the same time, and characterizing the average macrocirculation of field in the free atmosphere. The heat influx was calculated in accordance with the scheme proposed by the author using data of radio sounding of the atmosphere in January - July 1957 (03 - 15 hours) at 23 points located over the territory of the Soviet Union and Western Europe. The circulation indices used in the work were those proposed by A. A. Kats (Sezonnyye izmeneniya obshchey tsirkulatsii atmosfery i dolgosrochnyye prognozy [Seasonal Variations of the General Circulation of the Atmosphere and Long-term Forecasts], Gidrometeoizdat, 1960) for a meteorological series of

Card 1/2 UDC: 551.521: 551.513

ACC NR: AP6034770

elementary synoptic processes (ESP). All the values of the pressure, temperature, dew point and cloudiness were averaged for each ESP. All the necessary calculations were made with the high-speed electronic computer of the Leningrad State University by graduate student I. V. Mikhaylova. A fourteen-layer model of the atmosphere was used for the solution of the problem, the top of the atmosphere being considered to be the level c = 45 km. Various data on the atmosphere and its circulation were taken from numerous published sources. The results yielded a number of fields of radiant heat influx to the layer between 800 and 600 mb, each of which corresponding to a definite natural synoptic period with a characteristic type of circulation. The frequency with which the centers of fields of opposite signs coincided in different types of general circulation of the atmosphere were investigated. Various numerical data are cited in favor of the assumption that the two fields actually ineract, although the initial material, in spite of the large number of calculations, is still too scanty for a more conclusive analysis. Orig. art. has: 1 figure and 10 formulas.

SUB CODE: 04, 20/ SUBM DATE: 08Apr66/ ORIG REF: 006/ OTH REF: 004

Card 2/2

ACC NR: AT6036182 SOURCE CODE: UR/3116/66/277/000/0011/0019

AUTHOR: Yurgenson, A. P.

ORG: None

TITLE: Spectral absorption of longwave radiation in the atmosphere

SOURCE: Leningrad. Arkticheskiy i antarkticheskiy nauchno-issledovatel'skiy institut. Trudy, V. 277, 1966. Chislennyye metody issledovaniya gidrometeorologicheskikh usloviy v Arktike s ispol'zovaniyem elektronnykh tsifrovykh vychislitel'nykh mashin (Numerical methods of studying hydrometeorological conditions in the Arctic with the use of electronic digital computers), 11-19

TOPIC TAGS: spectral absorptivity, spectral distribution, artificial earth satellite, meteorologic satellite, meteorology, electromagnetic radiation, upper atmospheric radiation, electronic computer

ABSTRACT: The research done by Howard, Burch, and Williams [J. Howard, D. Burch and D. Williams. "Infrared Transmission of Sinthotic Atmospheres," J. of the Optical Soc. of America, 1956, Vol. 46, No. 4] is cited as leading up to other work concerned with the derivation of formulas for computing average absorption functions for selected wave lengths. The very real, current, problem facing the world's weather service is how best to use weather satellites, and it is pointed out that installing suitable equipment in such satellites and using them for long periods of time would make it

ACC NR: AT6036182

possible to amass a wealth of information concerning the physical condition of the atmosphere, the status of the underlying surface of the earth, or the upper limits of clouds. These data could to used for a variety of purposes. A preliminary stage is the amassing of material with respect to the investigation of transmission or absorption of departing longwave radiation in the layer between the earth and the upper limit of the troposphere, using a great many experimental observations and radiation measurements made over various geographic regions, and under different meteorological conditions. The use of a suitable equipped aircraft, or a group of aircraft, with a service ceiling of 12 to 15 km, is desirable. Results could be used to evaluate the accuracy of the instruments used to establish the radiation, as well as to disclose individual shortcomings in those instruments. Processing the results of what must necessarily be great quantities of various types of data would involve the use of high-speed electronic computers. Research has already shown that there are three basic groups of overlapping absorption belts in the real atmosphere in the longwave band of the spectrum. These have been examined and the results are presented in tabular form. Orig. art. has: 8 formulas and 6 tables.

SUB CODE: 04, ~~17~~ 20/SUBM DATE: None/ORIG REF: 002/OTH REF: 002

Card 2/2

YURGENSON, G.A.

A giant quartz crystal. Zap.Vses.min.ob-va 90 no.6:747-748 '61. (MIRA 15:2)

1. Zabaykal'skiy kompleksnyy nauchno-issledovatel'skiy institut Sibirskogo otdeleniya AN SSSR, g. Chita.
(Tarbagatai Range--Quartz)

ABRAMOV, L.Kh., inzh.; YURGENSON, G.M., inzh.

New technological developments in foreign countries. Khim.mashinostr. no.6:43 N-D '63. (MIRA 17:2)

YURGENSON, G.N., inzh.; SHLEYNIKOV, V.M., inzh.

News of technology abroad. Khim.mashinostr. no.4:45-46 Jl-Ag '63. (MIRA 16:9)

(Chemical engineering—Equipment and supplies)

YURGENSON, G.N., inzh.

New machines, apparatus, and instruments. Khim.mashinostr. no.5: 44-46 S-O '63. (MIRA 16:10)

YURGENSON, G.N., inzh.; ABRAMOV, L.Kh., inzh.

New developments in foreign technology. Khim.mashinostr. no.1:
45 Ja-F '64. (MIRA 17:4)

TOKAREV, V.A., inzh.; YURGENSON, G.N., inzh.

New developments in foreign technology. Khim.mashinostr. no.2: 46 Mr-Ap '64. (MIRA 17:4)

YURGENSON, I. A. Cand Biol Sci -- (diss) "Sanitary protection of sources of water supply ~~from~~ against pollution by waste waters of the slate industry. (As in the "Kiviyli" combine)" Mos, 1957. 11 pp 20 cm. (Acad Med Sci USSR), 100 copies (KL, 24-57, 117)

Yurgenson, I.A.

USSR /Chemical Technology. Chemical Products and Their Application
Water treatment. Sewage water.

H-5

Abs Jour: Referat Zhur - Khimiya, No 1, 1958, 1799

Author : Yurgenson I.A.

Title : Sanitary Characterization of Sewage Water of the Shale-Chemical Combine "Kiviyli".

Orig Pub: Gigiena i sanitariya, 1957, No 2, 63-64

Abstract: Total amount of sewage water resulting from thermal processing of shale in tunnel furnaces, is of 8710 m^3/day, of which 31% are nominally pure. The sewage water contains (in g per liter): coarsely dispersed admixtures 1.1-3.7; NH_3 0.87-1.77; volatile phenols o.13-1.35; non-volatile phenols 0.10-4.2; ketones 0.13-6.97; H_2SO_4 0-0.8 mg/liter. Titer of bacteria coli is above 333 for all sewage

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USSR /Chemical Technology. Chemical Products and Their Application
Water treatment. Sewage water.
H-5

Abs Jour: Referat Zhur - Khimiya, No 1, 1958, 1799

water. The sewage water causes extreme pollution of the rivers Erra and Purtse and of the water of the Gulf of Finland.

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5(3), 17(12)

AUTHORS: Terent'yev, A. P., Kost, A. N., Zolotarev, SOV/153-58-4-9/22
Ye.Kh, Vinogradova, Ye. V., Kalakutskaya, T. V., Yurgenson, I. A.

TITLE: I.The Esters of Tetrahydro-Phthalic Acid and Its Homologs as Insect Repellents (I.Efiry tetragidroftalevoy kisloty i yeye gomologov kak insektorepellenty)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, 1958, Nr 4, pp 55 - 60 (USSR)

ABSTRACT: Although the insect repellents have been more and more applied so far and thousands of individual preparations have been tested, neither the relation between their structure and efficiency nor their mechanism of efficiency have been definitely clarified. For these reasons the search for new means was often unsuccessful, whereas hardly a few of the thousands of tested substances were practically used. Dimethyl phthalate is the most carefully investigated and practically most applied repellent. Yet it is not efficient in any case, and large-scale use of it is limited by raw material

APPROVED FOR RELEASE: 09/19/2001 CIA-RDP86-00513R001963210009-0"

I. The Esters of Tetrahydro-Phthalic Acid and Its Homologs as Insect Repellents SOV/153-58-4-9/22

scarcity. The authors synthetized other prospective repellents: "Indalon","Rudzhers-612" (in the USSR RP-52) and "Dimelon" (RP-50), which had the same effect as or a weaker effect than dimethyl phthalate on various mosquito species. RP-50 was a little more active than others. Therefore the authors investigated, according to the structural analogy, a series of esters of the tetrahydro phthalic acid (RP-1, RP-2, RP-5, RP-17, RP-20, RP-23, RP-33 and RP-51). Dimethyl, diethyl and dibutyl phthalate were used for comparison. The compounds investigated are related in structure to dimethyl phthalate, but differ by their lack of aromatic bonds in the 6-membered ring. Diene hydrocarbons and maleic anhydride, which are easily obtained by benzene or furfural-oxidation, were the raw materials used for that purpose. In summer of 1954, Ye.Kh.Zolotarev and N.A. Tamarina investigated at the Belomorskaya biologicheskaya stantsiya MGU (White Sea Biological Station of the university mentioned in the title) the effect of individual preparations on mosquitoes Aëdes communis and Aë.dorsalis and cerato-

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pogonides of the species Culicoides. At the Ryazanskiy meditsinskiy institut imeni I.P.Pavlova (Ryazan' Medical Institute imeni I.P.Pavlov) it was found that a narcotic effect (fusel-oil drunkenness) is exercised by the dibutyl esters upon rats and rabbits. Large-scale tests in 1956 showed that the preparations RP-1 and RP-50 protect efficiently against the mosquitoes: Aëdes vexans, A.maculatus, A.excrucians, A.Cyprius, A. cataphylla, A.punctor, A.communis, A.cinereus, A. dorsalis, and Anopheles bifurcatus. A table shows the comparative efficiency of individual repellents. It results from this that the repellents RP-1, RP-17 and RP-51, which were investigated for the first time, are equal to dimethyl phthalate with respect to their efficiency. The efficiency degree of various mixtures of these compounds was not higher. Further investigations would be necessary only of RP-44 (dimethyl phthalate with diethyl adipate), RP-[illegible] (the same with dibutyl sebacinate) and RP-47 (the same with anisole), since they are a little longer efficient against mosquitoes. All preparations

I. The Esters of Tetrahydro Phthalic Acid and Its Homologs as Insect Repellents SOV/155-58-4-9/22

were investigated as to their acidity, which causes skin irritation, as is known. It was found that the introduction of a methyl or methylene group into the structure of the dimethyltetrahydro phthalate does not exert considerable influence upon the activity of the preparation. Admixtures were supplied by P.A.Moshkin, Corresponding Member, Academy of Sciences, USSR, and V.I.Lyubomilov, Candidate of Chemical Sciences. There are 1 table and 18 references, 5 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova (Moscow State University imeni M.V.Lomonosov) Kafedra organicheskoy khimii i kafedra entomologii (Chair of Organic Chemistry and Chair of Entomology)

SUBMITTED: November 2, 1957

Card 4/4

ZOLOTAREV, Ye.Kh.; FEDDER, M.L.; YUDIN, L.G.; YURGENSON, I.A.

Study of repellents. Report No.3: Acyltetrahydroquinolines as protective substances against fleas. Vest.Mosk.un.Ser.biol., pochv., geol., geog. 13 no.3:43-52 '58. (MIRA 12:1)

1. Kafedry organicheskoy khimii entomologii Moskovskogo gos. universiteta i TSentral'nyy dezinfektsionnyy nauchno-issledovatel'skiy institut.
(Quinoline) (Fleas) (Insect baits and repellents)

YURGENSON, I.A. (Tallinn)

Work of the biological sewage treatment plant at the "Kohtla-Järve" shale processing combine. Vod.i san.tekh. no.2:16-18 F '60. (MIRA 13:5)
(Kohtla-Järve--Sewage disposal plants)

AKKERBERG, I.I., kand.med.nauk; BLINOVA, E.A.; VIDOMENKO, A.N.; YURGENSON, I.A. [Jürgenson, I.], kand.biologicheskikh nauk; YANES, Kh.Ya. [Jänes, H.]

Hygienic determination of air pollution in a shale industry region. Gig.i san. 25 no.8:5-7 Ag '60. (MIRA 13:11)

1. Iz Instituta eksperimental'noy i klinicheskoy meditsiny Akademii nauk Estonskoy SSR.
(AIR-POLLUTION) (SULFUR DIOXIDE)

YURGENSON, I.A.; TEPLYKH, V.S.

Bairamlia fuscipes Waterston (Hymenoptera, Pteromalidae), a parasite of fleas. Zool. zhur. 39 no.12:1879-1880 '60. (MIRA 14:1)

1. Department of Entomology, Moscow State University.
(Chalcid flies) (Parasites--Fleas)

ARTYUKHOV, I.A., inzh.; YURGENSON, K.A., inzh.

Utilization of casing-head gas. Bezop.truda v prom. 4 no.12: 16-17 D '60. (MIRA 14:1)

1. Neftegazovoye upravleniye Grozneftegaz.
(Gas, Natural)

1. YURGENSON, L.

2. USSR (600)

4. Farm Buildings-Heating and Ventilation

7. Ventilation system in the cattle barn on the "Voskhodiashchaia zvezda" Collective Farm. Sel'. stroi. 7 no. 6 1952

9. Monthly List of Russian Accessions, Library of Congress, March 1953. Unclassified.

LENTSNER, A.; YURGENSON, M. [Jürgenson, M.]

Accelerated methods of determining gelatinase. Lab. delo 8 no.10:37-39 '62 (MIRA 17:4)

1. Kafedra mikrobiologii, infektsionnykh bolezney i dermatologii Tartuskogo gosudarstvennogo universiteta.

KOSHELEV, F.F.; KAMENSKIY, B.Z.; YURGENSON, M.P.; VOSTROKNUTOV, Ye.G.

Rubber patches for on-the-road repairing of tire tubes.
Kauch.i rez. 21 no.12:43-45 D '62. (MIRA 16:1)

1. Nauchno-issledovatel'skiy institut shinnoy promyshlennosti.
(Tires, Rubber—Repairing)